# Chapter 33

Inflammation

* Chemical mediators
  + Histamine, leukotrienes, bradykinin, complement, prostaglandins
  + Act as alarms to notify the surrounding area of injury
  + Histamine
    - Key chemical mediator
    - Stored within mast cells
    - Mast cells
      * Detect foreign agents or injury
      * Respond by releasing histamine
    - Initiate the inflammatory response within seconds
    - Dilates nearby blood vessels
    - Capillaries become more permeable
    - The area become congested with blood causing swelling and pain
  + Anaphylaxis
    - Rapid release of chemical mediators on a large scale
* Benefits of anti-inflammatory agents
  + Allergic rhinitis
  + Anaphylaxis
  + Ankylosing spondylitis
  + Contact dermatitis
  + Crohn’s disease
  + Glomerulonephritis
  + Hashimoto’s thyroiditis
  + Peptic Ulcer disease
  + Rheumatoid arthritis
  + Systemic lupus erythermatosus
  + Ulcerative colitis

NSAIDs

* Treats mild to moderate inflammation
* Inhibits the synthesis of prostaglandins
* Prostaglandins
  + Needs cyclooxygenase (COX) for biosynthesis
  + NSAIDs prevents this from happening
* COX
  + COX-1
    - Causes
      * Decreased acid production
      * Increased mucus production
      * Increased platelet aggregation
      * Renal protection
      * Vasodilation
      * Bronchodilation
  + COX-2
    - Causes
      * Inflammation
      * Pain
      * Fever
      * Decreased platelet aggregation
  + Aspirin and ibuprofen blocks both COX-1 and COX-2
    - Results (Because COX-1 is inhibited)
      * Bleeding
      * Gastric upset
      * Reduced kidney function
* Aspirin (ASA)
  + Belongs to salicylates
  + Prevent abnormal clot formation and stroke
  + Large doses results in high incidence of adverse effects
    - Increasing gastric acid secretion
    - Irritating the stomach lining
    - Epigastric pain
    - Heartburn
    - Bleeding due to ulceration
    - Potent antiplatelet effect
    - Produce salicylism
      * Tinnitus
      * Dizziness
      * Headache
      * Excessive sweating
  + Some are buffered or enteric coated to minimize adverse GI effects
  + Uses
    - Antipyretic
      * Causes vasodilation and sweating
    - Anticoagulant
      * Reduces the risk of mortality following MI
      * Reduces strokes
  + Contraindicated
    - Patient receiving anticoagulant therapy
      * Such as warfarin, heparin, and plicamycin
  + Lab tests
    - Prothrombin Time
    - Cholesterol
    - Potassium
    - PBI
    - T3 and T4
    - Liver function test (LFT)
  + Overdose
    - Activated charcoal
    - Gastric lavage
    - Laxatives
* Ibuprofen
  + Alternative to aspirin
  + COX-1 and COX-2 inhibitor
  + Low incidence of adverse effects
    - Most common
      * N/V
      * Gastric ulceration and bleeding
      * Kidney toxicity
      * Affect platelet function and increase bleeding potential
      * Increased risk of thromboembolic events
      * Cause/worsen hypertension
      * Heartburn
      * Epigastric pain
      * Dizziness
  + Use
    - Mild to moderate pain
    - Fever
    - Inflammation
    - Rheumatoid/Osteoarthritis
    - Dysmenorrheal
  + Contraindications
    - Treatment of perioperative pain of coronary artery bypass graft(can cause stroke or MI)
    - Active peptic ulcers
    - Renal or hepatic impairment
    - Nasal polyps
    - Angioedema
    - Bronchospasm
    - Asthma patients
    - Allergies to aspirin
  + Lab test
    - Aspartate transaminase (AST)
    - Alanine Transaminase (ALT)
    - Hemoglobin and Hematocrit
  + Overdose
    - Alkaline drug
      * To increase urinary excretion
* COX-2 Inhibitors
  + No adverse affect on the digestive system
  + No blood coagulation effects
  + Moderate to severe inflammation
  + Celecoxib (Celebrex)

Glucocorticoids (Corticosteroids)

* Suppress severe inflammation
* Short-term treatment of a severe disease
* Natural hormones released by the adrenal cortex
* Prednisone
* MOA
  + Inhibit biosynthesis of prostaglandins
  + Suppress histamine release
  + Inhibit certain functions of phagocytes and lymphocytes
* Uses
  + Neoplasia
  + Asthma (Acute bronchospasm)
  + Arthritis
  + Corticosteroid deficiency
* Adverse effects
  + Suppression of normal functions of the adrenal glad
  + Hyperglycemia
  + Mood changes
  + Cataracts
  + Peptic ulcers
  + Electrolyte imbalances
  + Osteoporosis
  + Mask infections
  + Immune suppression
* Alerts
  + Cushing’s syndrome
    - Sign of overtreatment of corticosteroids
    - S/S
      * Hyperglycemia
      * Fat redistribution to the shoulders and face
      * Muscle weakness
      * Bruising
      * Bones that easily fracture
    - Body becomes accustomed to high doses of glucocorticoids
    - Discontinue drugs gradually b/c abrupt withdrawal leads to an acute lack of adrenal function

Fever

* In young children
  + Can stimulate febrile seizures
* In adults (especially elderly)
  + Can breakdown tissues
  + Reduce mental acuity
  + Lead to delirium or coma
  + Too high can be fatal
* Can be drug induced
  + Anti-infective most common
    - When antibiotics kill microorganisms pyrogens (fever producing chemicals) are released.
* Acetaminophen
  + MOA
    - Direct action of the hypothalamus
    - Causes dilation of peripheral blood vessels
    - Enable sweating and dissipation of heat
  + Use
    - Reduce fever
    - Reduce pain
  + Adverse effects
    - N/V
    - Chills
    - Abdominal discomfort
    - Fatal hepatic necrosis
    - Liver damage/failure
    - Renal failure
  + Contraindications
    - Patients with hypersensitivity
    - Chronic alcoholism
  + Lab Test
    - Hepatic function test
    - Bilirubin
    - AST
    - ALT
    - Serum uric acid
  + Overdose
    - IV N-acetlycysteine (Acetadote)
      * Protects the liver from toxic metabolites of acetaminophen